

CHAPTER THREE

Airport Facility Requirements

CHAPTER THREE - AIRPORT FACILITY REQUIREMENTS

This element describes the facility requirements for the Cochise County Airport that will be needed to satisfy anticipated aviation demand through the year 2017. Airport facility requirements are determined from information derived in the forecast analysis and from FAA criteria for design of airport components. The analysis yields estimates of required "airfield" improvements such as runways, taxiways, navigational aids, marking and lighting; and "landside" improvements, such as hangars, terminal buildings, aircraft parking aprons, fueling facilities, vehicle parking spaces, and airport access requirements.

AIRFIELD SYSTEM

The development of airfield facilities such as runway length, navigational aids and airport lighting are based primarily upon the characteristics of the aircraft which are expected to use the airport. The most important characteristics are the approach speed and the wing span of the "critical" aircraft expected to use the airport.

FAA groups aircraft according to their performance and size. The categories range from Approach Category A, for slower single-engine piston aircraft, to Approach Category E, for super-sonic jet aircraft. The "critical" general aviation aircraft group forecast to use Cochise County Airport falls into Category B (approach speed 121 knots or more but less than 141 knots).

Along with the aircraft's approach speed, the airplane's wingspan is another principal characteristic which affects airport design standards. There are six Airplane Design Groups which range from Group I, for small aircraft with wingspans less than 49 feet, to Group IV for the largest air carrier and cargo aircraft. Civil aircraft now using Cochise County Airport fall into Design Groups I and II (wingspans less than 79 feet).

Therefore, the ultimate specific "critical" design aircraft group for the Cochise County airport is the (FAA Approach Category B and Design Group II) which includes the Beech King Air. Figure 3.1 shows the critical aircraft and performance data.

The future B-II classification was determined for Cochise County Airport based on several factors. The factors are: (1) critical aircraft requirements and performance characteristics; (2) itinerant operations by the critical aircraft (500 annual - minimum), (3) common business aircraft usage with respect to the Willcox area; and (4) the aviation forecasts.

Runway Requirements and Orientation

The condition and adequacy of the existing runway system at Cochise County airport, including the number of runways, runway orientation, airfield capacity, runway length, and pavement strength, was assessed. From this analysis, future runway requirements were determined.

Area wind characteristics are a major factor in determining the optimum number and alignment of runways. Wind data (speed and direction) has been recorded and assembled from the Tucson, Arizona Airport Weather Station. The data were collected from 1986-1995 and included 87,648 observations. *It is recommended that an additional wind analysis be completed at the airport to get the most accurate wind data possible.* Table 3.1 shows windspeed and percent coverage for Cochise County Airport. The all-weather wind rose is shown in Figure 3.2. The wind rose was used for calculating the wind coverages for the runway alignments.

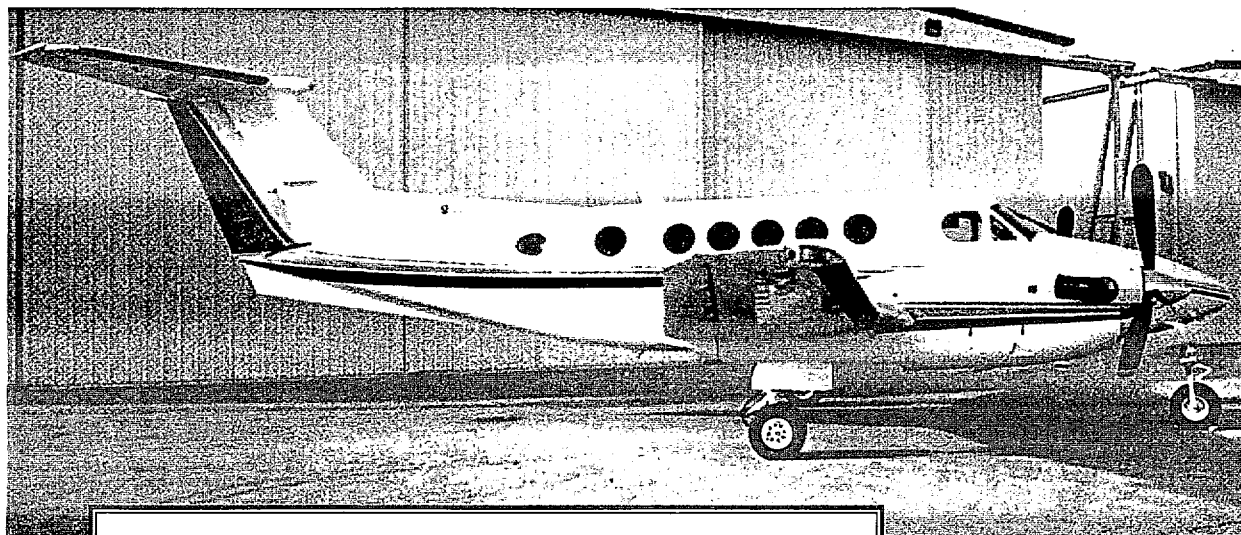
Table 3.1 Wind Speed and Percent Coverage Cochise County Airport		
Runway	Crosswind Component	Percent Coverage
All-Weather		
03-21	12 M.P.H. (10.5 Knots)	89.20%
03-21	15 M.P.H. (13 Knots)	93.74%
03-21	18 M.P.H. (16 Knots)	98.41%
14-32 (closed)	12 M.P.H. (10.5 Knots)	94.29%
14-32 (closed)	15 M.P.H. (13 Knots)	97.09%
Combined	12 M.P.H. (10.5 Knots)	98.45%
Combined	15 M.P.H. (13 Knots)	99.68%
Source: Weather Reporting Station, Tucson International Airport Period 1986-1995 Number of Observations 87,648 Wind rose information provided through computerized wind rose analysis per A/C 150/5300-13.		

The established goal for wind coverage is 95 percent; that is, a light plane should be able to operate at an airport 95 percent of the time during a given period without experiencing a crosswind component greater than twelve m.p.h. Twelve m.p.h. winds are applicable for smaller single engine type aircraft. Fifteen m.p.h. winds are applicable to the larger turbo-prop and business jet aircraft which are less sensitive to crosswinds. Where a single runway does not provide a 95 percent usability factor at twelve or fifteen m.p.h., a crosswind runway is required. Wind coverage for Runway 03-21 totals 89.20% at twelve (12) m.p.h. and 93.74% at fifteen (15) m.p.h.

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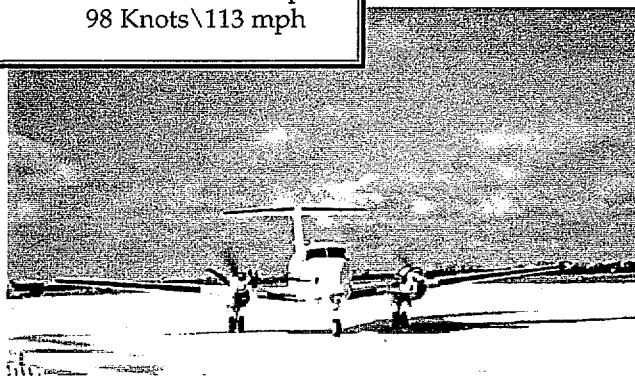
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Figure 3.1
Critical Aircraft



ITEM	DIMENSION
Wingspan	54' 6"
Length	43' 9"
Height	15' 0"
Wheelbase	14' 11"
Wheel Track	17' 2"

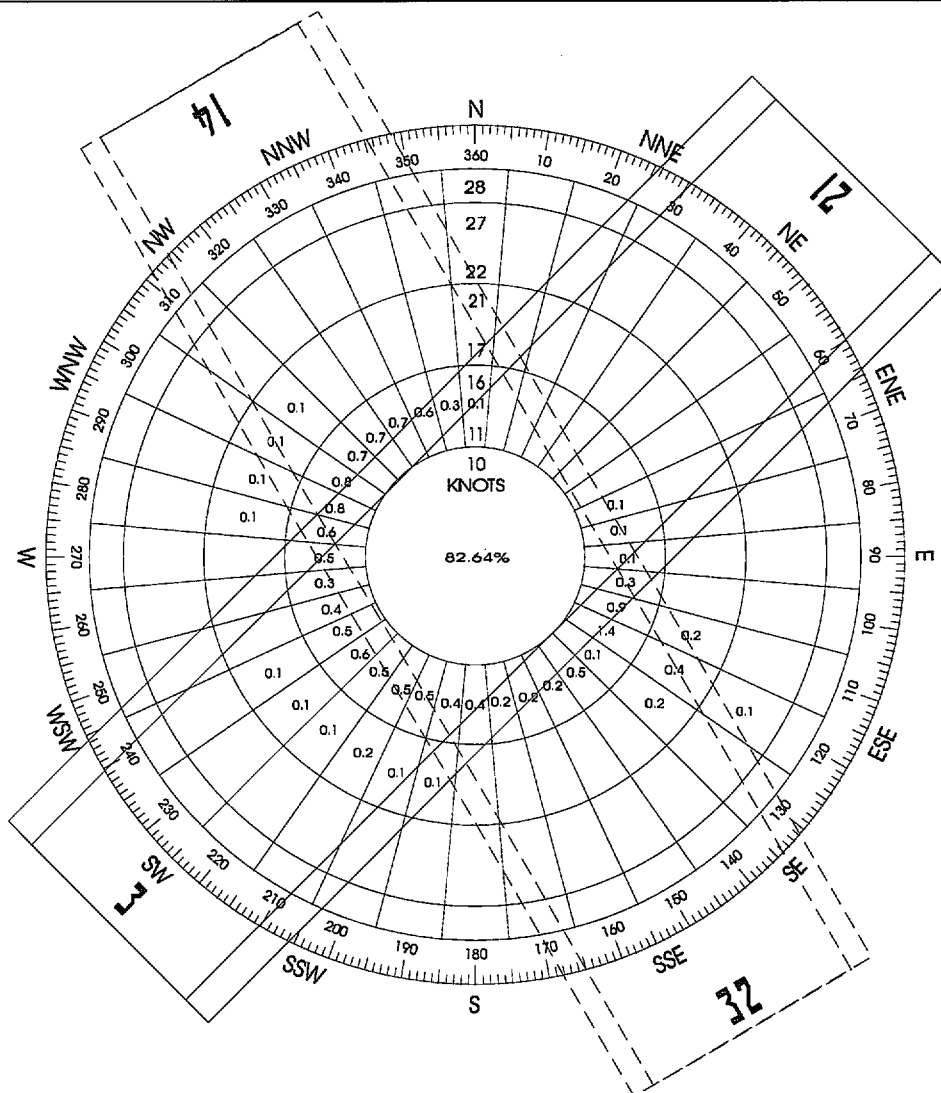
ITEM	PERFORMANCE
Maximum Take Off/Landing	12,500 lbs.
Maximum Cruising Speed	289 Knots\333 mph
Approach Speed (Flaps Down)	98 Knots\113 mph



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Figure 3.2
All Weather Wind Rose



WIND ROSE ANALYSIS		
Rwy. Alignment	Wind Velocity	Wind Coverage
3 - 21	10.5 Knots	89.20%
3 - 21	13.0 Knots	93.74%
14 - 32	10.5 Knots	94.29%
14 - 32	13.0 Knots	97.09%
0-3 Knots = 7.9% Source: Tucson International Airport 4-10.5 Knots = 74.74% Weather Reporting Station 87,648 Observations 1986 - 1995		

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The analysis of the wind rose for the area revealed that the one existing active runway at Cochise County Airport would be adequate for the long-term. Based on the "critical" aircraft group expected to use the airport, maintenance of the primary runway to the ARC B-II category is recommended.

Runway Length, Width, and Strength

The primary runway length requirements were determined based on three factors: (1) the "critical" aircraft type expected to use the airport; (2) the mean maximum daily temperature of the hottest month; and (3) the airport elevation and the maximum difference in runway elevation. Based on Cochise County Airport site factors [MSL elevation = 4,181', design temperature = 95° F., 500 mile stage length, effective runway gradient (10' difference in elevation)], the required runway lengths were determined and are shown in Table 3.2.

Table 3.2 Runway Requirements Cochise County Airport			
Runway Pavement			
Runway Design Category	Length	Width	Strength
ARC A-I, A-II: 75 % of Small Airplanes	4,170'	60'	8,000 lbs. (S)
ARC B-I: 95 % of Small Airplanes	5,480'	60'	8,000 lbs. (S)
ARC B-II: 100 % of Small Airplanes	5,790'	75'	12,500 lbs. (S)
ARC B-II: Small Airplanes + 10 Seats	5,790'	75'	30,000 lbs. (S)
ARC C-II: Airplanes More Than 60,000 lbs.	6,480'	100'	60,000 lbs. (D)
(S) - Single-wheel gear			
Sources: F.A.A. Advisory Circular 150/5300-13, "Airport Design," and 150/5325-4A, "Runway Length Requirements for Airport Design." A.R.C. = Airport Reference Code			

Demand/Capacity Analysis

Another factor used to determine necessary airfield improvements is the comparison between demand and capacity. The most common means of measuring airfield efficiency is by determining the airport's operational capacity, or Annual Service Volume (A.S.V.). The A.S.V. is defined in *FAA Advisory Circular 150/5060-5, Airport Capacity and Delay*, as a reasonable estimate of an airport's annual capacity. Overall, demand/capacity figures

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establish a time-frame for projecting developments to preserve and enhance airport operational safety.

Ultimate annual operations are estimated to total approximately 9,680 per year by the year 2017. The A.S.V. divided by the total annual operations produces the demand/capacity ratio, as expressed in percent. Given the forecast operating level of 9,680, the ultimate A.S.V. is as follows:

$$\frac{9,680 \text{ Annual Operations}}{230,000 \text{ A.S.V.}} * 100 = 4.2\%$$

As described in FAA Order 5090.3B, *Field Formation of the National Plan of Integrated Airport Systems (NPIAS)*, airports are recommended by the FAA to initiate planning to preserve and enhance capacity when 60 percent of the ASV has been reached. With an A.S.V. of 230,000, it would take 138,000 annual operations to generate a demand/capacity ratio of 60%. As identified in Chapter Two annual operations are not expected to exceed this level during the planning period (1997-2017). Therefore, airfield improvements specifically designed to increase "airside" capacity will not be necessary during the planning period.

Taxiways

Taxiways are one of the most important factors in determining and maintaining the operational safety of an airport. As airport activity increases (take-offs, landings, and touch-and-go maneuvers), faster access from the runways to the taxiway system is required to maintain safety.

A full parallel taxiway system is normally recommended as airport activity approaches 20,000 annual operations. Partial parallel taxiways are recommended when activity levels reach 10,000 annual operations. Turnarounds at runway ends are recommended for all runways. With airport operations approaching 10,000 per year at Cochise County, the existing parallel taxiway to Runway 3-21 should be maintained and improved as part of the development program.

The taxiway strength for A.R.C. B-II runways/taxiways should be designed to accommodate the design aircraft that will use the pavement. All taxiways should support a B-II aircraft.

Terminal Navigation Aids

Airport navigational aids (NAVAIDS) are facilities and equipment installed on or near the airport for the purpose of providing pilots with electronic guidance and/or visual references to execute an approach to land at the airport. The importance of NAVAIDS is frequently dismissed due to a lack of understanding regarding their purpose, and their equipment and airspace complexity.

The purpose of upgrading navigational aids is to increase an airport's reliability. Navigational aids add reliability to air transportation by allowing aircraft to operate during inclement weather. Each facility in the NAVAID development process adds greater reliability but at increasing cost. The *traditional development* process is as follows: (1) Non-Directional Beacon (NDB), (2) VOR or VORTAC, (3) Localizer, (4) Approach Lighting System, (5) Glide Slope Instrumentation, and (6) Precision Instrument Landing System (ILS/MLS). Each step allows aircraft to fly during progressively bad weather; i.e., progressively lower ceilings and visibility.

Currently, many of the traditional navigation systems are being phased out by the FAA and new advances in navigation/satellite technology will change present navigational systems. Global Positioning System (GPS) is a satellite navigational system that encodes transmissions from ground-based data link stations and satellite transmitters with an on-board portable receiver. The system works through lines of position (LOP) and is presently used for en route navigation and non-precision instrument approaches. Precision instrument approaches have not been approved; however, G.P.S. will most likely be the means of all navigation in the future, with present electronic aids used as a backup system. It is predicted that eventually GPS will provide worldwide navigation coverage because of its position accuracy capability and ability to have its signals unaffected by weather conditions. Because Cochise County Airport has a G.P.S. approach, the traditional development items are not necessary.

TERMINAL AREA REQUIREMENTS

The terminal area or "landside" is defined as that portion of the airport other than the landing area. Functions and facilities include the terminal/administration building, aircraft storage hangars, the aircraft parking apron for based aircraft and itinerant aircraft, fixed base operations (aircraft repair and maintenance, flight training, aircraft sales, fuel facilities, etc.), aviation-related service businesses, and auto parking. An analysis was performed for each terminal element to determine future development requirements.

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Terminal space requirements are based upon peak hour passengers (including pilot) and the approximate square feet of space needed per passenger. Table 3.3 shows design hour passengers and Table 3.4 identifies terminal space requirements.

Table 3.3 Design Hour Passengers/Operations Cochise County Airport				
Peaking Characteristics	Existing	2002	2007	2017
Annual Operations	7,000	7,000	7,250	9,680
Peak Month Operations (x .11)	770	770	798	1,065
Design Day Operations (÷ 30.4)	25	25	26	35
Design Hour G.A. Operations (x .15)	4	4	4	5
Passengers/Operation	1.9	2.0	2.2	2.4
Design Hour Passengers	8	8	9	12

Table 3.4 Terminal Building Needs (Sq. Ft.) Cochise County Airport				
Required Space per Passenger Sq. Ft.	Existing	2002	2007	2017
Design Hour Passengers	8	8	9	12
Waiting Area/Pilots Lounge (15)	120	120	135	180
Management Operations (10)	80	80	90	120
Restrooms (5)	40	40	45	60
Concessions (3)	24	24	27	36
Circulation, Storage Mechanical, etc. (20)	160	160	180	240
Meeting Space (optional)	600	600	600	600
TOTAL TERMINAL BUILDING REQUIREMENTS (Sq. Ft.)	1,024	1,024	1,077	1,236

() Average square footage needed per passenger.

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Aircraft Hangars

For planning purposes, at any given airport approximately 80 percent of based aircraft are assumed to be hangared. At the present time there is a slight hangar shortage in Cochise County, with only one-third of the based aircraft in hangars. Table 3.5 shows existing and future hangar requirements. The survey indicated that several aircraft owners would consider building a private conventional hangar if acceptable lease terms could be arranged.

Table 3.5 Hangar Requirements Cochise County Airport				
	Existing	2002	2007	2017
Based Aircraft	24	24	25	34
Aircraft Hangared	17	19	20	27
Conventional Hangar Spaces	1	3	4	4
T-Hangar/Shade Spaces	16	16	16	23
Conventional Hangar Area *	11,600 S.F.	14,800 S.F.	18,000 S.F.	18,000 S.F.
Total T-Hangar/Shade Area	18,000 S.F.	18,000 S.F.	18,000 S.F.	26,400 S.F.
Total Hangar Space	29,600 S.F.	32,800 S.F.	36,000 S.F.	44,400 S.F.

* Includes FBO Hangar

Hangar development at Cochise County Airport is recommended to be on an amortization schedule. It is common for airport hangars to be financed through local funding and then leased to private owners under an amortization term. Another option is to allow construction of hangars using private financing (individuals, companies, partnerships) with the airport owner leasing ground for the hangar development. Table 3.6 shows estimated payments associated with hangar development. Hangar costs and rentals are based on new construction and not meant to be applied to existing structures.

Table 3.6 Amortization Costs for Aircraft Hangars (Principal & Interest)						
Hangar Type/Size	Hangar Cost	Finance Term	Yearly Payment	Monthly Payment	Storage Units	Monthly Rental
Conv. Hangar (80'x80')	\$320,000	25 years @ 8%	\$29,640	\$2,470	5	\$494
T-Hangar (10 Unit)	\$170,000	25 years @ 8%	\$15,744	\$1,312	10	\$131

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Aircraft Apron

According to discussions with the airport manager, during peak periods additional itinerant tiedowns are needed. This is due to the arrival of flying clubs or groups that visit the airport. Currently there are 10 paved tie-down spaces and 6 additional adjacent to the apron in a turf area at Cochise County Airport. The turf tie-down areas should be paved. Table 3.7 shows apron and tie-down requirements. New pavement strength should be equivalent to the existing portions of the aircraft apron.

Table 3.7 Aircraft Apron and Tie Down Requirements Cochise County Airport				
	Existing	2002	2007	2017
Based Aircraft	24	24	25	34
Local AC Tie-Down Spaces * (needs)	7	7	7	7
Itinerant Aircraft Tie-Down Spaces (needs)	14	15	17	19
Total Terminal Apron Area Tie-Downs (needs)	21	22	24	26

* Increase in based aircraft to be located in hangar facilities.

Airport Access

Ground access and convenience is a high priority for a general aviation such as Cochise County Airport. The airport must be quickly reached by the majority of those who use the facility, and the best way to provide ground access convenience is to have direct entry to a major highway in the region. It is also beneficial if the airport is visible from the highway for the purposes of orientation. The existing access to the airport terminal does not provide direct access from Interstate 10, nor is the access point easily identified. Better directional signage is necessary from Interstate 10 exit 340 (Taylor Road) and from downtown Willcox. Additionally, aesthetic improvements such as tree planting, road maintenance, etc., all provide a positive impact on the visitor to the area and improve the airport's image as well. All airport road improvements should conform to Cochise County development standards.

Automobile Parking

The requirements for terminal area automobile parking is a function of the design hour passenger. The total number of parking spaces was determined as 1 space per design hour passenger. Currently, approximately 25 public auto parking spaces exist near the terminal which is the level required through the planning period. For user comfort and safety the area adjacent to the terminal should be paved, and conform to Cochise County development standards.

Fuel Storage

Fuel storage should be provided based on an average month of airport activity. The type of fuel stored, whether Avgas, 100LL, or Jet A, depends on the actual airport users needs. Aircraft fuel storage capability at Cochise County Airport is adequate over the planning period. Cochise County Airport has two 10,000 gallon tanks, one with Jet-A and one with 100 LL fuel.

SUMMARY

Improving the airport to retain and gain further market share of the aviation activity in the region and higher usage by related industries is important to local sponsors. The purpose of this chapter has been to identify the facilities necessary to meet the forecast demand at Cochise County Airport. A summary of all facilities requirements is shown in Table 3.8. A summary of the total phasing plan and costs associated with each phase is shown in the following chapter.

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Table 3.8 Summary - Facility Requirements Cochise County Airport			
Facilities	Phase 1 (1997 - 2001)	Phase 2 (2002 - 2006)	Phase 3 (2007 - 2017)
Based Aircraft	24	25	34
Runway 03-21	6,095' x 75' 50,000 SWG	6,095' x 75' 50,000 SWG	6,095' x 75' 50,000 SWG
NAVAIDS	GPS	GPS	GPS
Lighting Aids	MIRL	MIRL	MIRL
Aircraft Parking Apron	6,700 S.Y.	7,700 S.Y.	9,700 S.Y.
Total Tie-Downs (needs)	21	22	26
Hangar Spaces			
Conventional Spaces	1	4	4
T-Hangar Spaces	16	16	23
Terminal Building	1,300 S.F.	1,300 S.F.	1,300 S.F.
Auto Parking	25 - 10 paved	25 - 12 paved	25 - 15 paved
Fuel Storage	Jet A - 100LL	Jet A - 100LL	Jet A - 100LL